# PROGRESS

*of the*

# Barberry Eradication Campaign

*in*

# WISCONSIN in 1929

*Our Grain Crops Must Be Protected from Black Stem Rust*

## *Barberry Eradication Pays*

# Remove the Barberry and Break the Rust Cycle

## Spring

Cluster Cup Stage of Rust on Barberry Leaf

Barberry Bush

## Winter

Black Stage on Straw, Stubble and Wild Grasses

## Summer

Red Stage of Rust on Growing Grain. Repeats Every Ten Days

*The Life Cycle of Black Stem Rust*

The World's Most Destructive Disease of Wheat, Oats, Barley and Rye

## Harvest Time

Black and Red Stages of Rust on Mature Grain

**All Common Barberries act as starting points for Black Stem Rust early each spring. By destroying the barberry the early spring source of black stem rust is eliminated. The Common Barberry provides a means to bridge the gap between the black stage on grain in the fall and the red stage of the rust on grains and grasses the following spring.**

**BOOST BARBERRY ERADICATION—A PRACTICAL RUST CONTROL MEASURE**

# PROGRESS OF BARBERRY-ERADICATION CAMPAIGN IN WISCONSIN, 1929

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## Introduction

One of the most common and widely known diseases of crop plants in the Upper Mississippi Valley is black stem rust of small grains. Hardly a year passes that the disease does not cause severe losses to grain producers somewhere in this region, while in many years it occurs in widespread epidemics almost ruining these crops. Wisconsin has experienced an average loss from stem rust of more than $1,000,000 each year since 1916.

In the northern part of the United States, where only the black stage of the rust survives the winter, the common barberry bush is necessary for stem rust to gain a start in the spring. The germinating black spores can survive only on barberry leaves. If barberry bushes are present the rust attacks them and spreads from there to growing grains and grasses. If no barberry bushes are near the rust spores die. Common barberry (Berberis vulgaris L.) is a necessary host in the life cycle of black stem rust. In view of this fact, the United States Department of Agriculture, in cooperation with 13 States in the upper Mississippi Valley, including Wisconsin, has undertaken to eradicate this rust-spreading plant within the area mentioned. It is now known that barberry grows in nearly every county of Wisconsin and in great abundance in the counties of the southern half of the State. More than 5,000,000 bushes have been removed from Wisconsin.

## All Known Methods of Rust Control Must Be Employed

While barberry eradication is the most immediately effective means of control, there are several known methods for reducing grain losses due to black stem rust. Early sowing of grain, proper preparation of the seed bed, avoidance of low, poorly drained land, proper use of fertilizers, in fact, anything that promotes early ripening of the grain, will help reduce the danger from rust.

Certain varieties of wheat, oats, and barley that are more rust resist-

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1/ State Leader of barberry eradication in Wisconsin.

2/ From the beginning of the campaign in 1918 until January 1, 1930, barberry eradication was a project of the Office of Cereal Crops and Diseases, of the Bureau of Plant Industry. On January 1, 1930, the Office of Barberry Eradication was established as a separate unit of the Bureau.

ant than others have been produced by plant breeders. Wherever these varieties meet the requirements of a given region and are desirable from the standpoints of yield, milling quality, and resistance to other cereal diseases, they should be substituted for the less satisfactory varieties.

## New Strains of Destructive Black Stem Rust Develop on the Common Barberry

The production of rust-resistant varieties of grain probably will be much more successful when all common barberry bushes have been eradicated. The reason for this is shown in the recent important discoveries made in the Canadian Rust Research Laboratories at Winnipeg and by Dr. E. C. Stakman and his co-workers at the University of Minnesota. Both of these groups, doing independent research, have proved that entirely new strains of stem rust are produced if two different rust forms crossbreed on barberry leaves. The certainty that new forms of the dangerous disease may appear suddenly, makes the eradication of the common barberry all the more imperative, since it is on the barberry alone that this crossing can occur. The new and apparently resistant varieties of grains are not safe with barberries near. If for no other reason than to protect the new kinds of rust-resistant wheat which are now in the process ofbeing developed, all common barberry bushes should be destroyed.

## Sources of Black Stem Rust in Wisconsin

### The Common Barberry

The most important source of rust in Wisconsin is the common barberry bush, on which the stem-rust fungus takes its start very early each spring. It soon spreads to grains and grasses, where from a small start it multiplies very rapidly and may advance many miles from the original location. Each year many small rust spreads are seen to appear on grains and grasses near barberry bushes that have become infected with rust. These rusted areas may remain localized, or, in "rust years," may spread out to form regional epidemics and cause severe losses. The extent of spread is limited largely by conditions of moisture and temperature during the spring and early summer.

### Rust from Southern States

It also is known that in some years black stem rust may be blown into Wisconsin from the Southern States, where it can live through the winter and begin to grow in the spring without the aid of the common barberry. The experience of the past years indicates, however, that this source of rust is not of great importance in Wisconsin. This so-called wind-blown infection usually arrives very late in the season and causes little damage.

### Overwintering of Stem Rust

It is now well known that, except in very rare cases, stem rust does

# BLACK STEM RUST SPREADS FROM COMMON BARBERRIES


to Wheat, Oats, Barley, Rye and other Grasses.

*Black Stem Rust as it appears on the leaves of the Common Barberry*

*Enlarged single leaf*

*Plump healthy grain*

*Shriveled rusted grain*

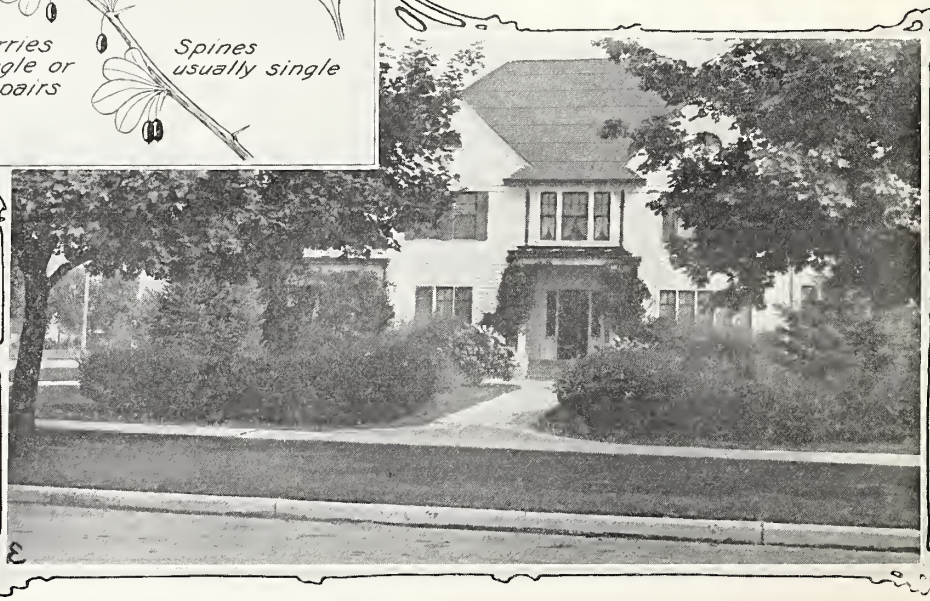
## DANGEROUS NEIGHBORS

Common Barberry Bushes growing near grain fields

# Report Common Barberry bushes you may find to your State Leader of Barberry Eradication.

*Common Barberry is harmful, destroy*


*Japanese Barberry is harmless, do not destroy*



not overwinter in Wisconsin in such a condition that it can resume growth in the spring without the aid of the common barberry. These exceptional cases are not an important factor in the stem-rust problem.

## What Barberry Eradication May Be Expected to Accomplish

Removal of barberry bushes now growing in the State will have a greater value than the mere elimination of the present source of rust. Barberry bushes have been growing for less than 75 years in many parts of Wisconsin where they are now very abundant because of their ability to multiply and spread rapidly. If the bushes growing in the State now are allowed to increase at the present rate it would be but a short time until this source of rust would become so universally distributed that little chance would remain for a grain field to escape early black stem rust infection. Therefore eradication now, means the elimination of a future menace which would make practically impossible the profitable production of rust-susceptible grains.

Rust may spread far from one-rust-spreading barberry, yet the fields quite close to the bushes are the first to become diseased and the ones most sure to suffer heavy losses. Therefore the eradication of common barberry by the property owners or the Government field agents will result in considerable local protection, while control of general rust spreads may be expected after the entire barberry-eradication area is relatively free of barberry bushes.

Black stem rust is the most important rust disease in Wisconsin, but it is only one of several which attack grain crops. Barberry eradication will not protect crops against the other rusts. One other rust, commonly known as crown rust of oats, often is very conspicuous on the leaves of oat plants. This rust is orange yellow in color during its early stages but changes to a shiny black as the grain matures. It often seriously damages the oat crop. Crown rust spreads from the buckthorn bush, which grows very commonly in the southern portion of Wisconsin. Leaf rusts of wheat, rye, and barley also are common in Wisconsin, but losses caused by them are much less severe than those resulting from black stem rust. It is well to distinguish between black stem rust and these other rusts of lesser importance.

## Support and Financing of Barberry Eradication

Barberry eradication is being conducted in 13 States of the upper Mississippi Valley by the United States Department of Agriculture in cooperation with various State agricultural agencies. Funds for the work in Wisconsin are supplied chiefly by Federal appropriations. A smaller appropriation is made by the State of Wisconsin and administered through the Division of Insect and Plant Disease Control of the Wisconsin State Department of Agriculture and Markets. Much valuable cooperation and service also are rendered by this State Department.

Material aid and close cooperation are given by the College of Agriculture of the University of Wisconsin and by the State Farm Bureau Federation.

The Conference for Prevention of Grain Rust, at Minneapolis, an organization of agricultural and business leaders, cooperates very closely in several phases of the campaign.

## Organization and Personnel of Barberry-Eradication Forces

The barberry-eradication campaign in Wisconsin is directed by a State Leader employed by the United States Department of Agriculture. The office of the State Leader is at Madison, Wis., where office facilities are provided by the Division of Insect and Plant Disease Control of the Wisconsin State Department of Agriculture and Markets.

To aid in the field activities about 30 agents are employed for a period of four to six months in the spring, summer, and fall. These field agents are selected because of their training in scientific agriculture and their practical farm experience. They also receive special training in methods of survey and eradication before being sent into the field.

The field agents are organized into groups of six, known as squads, each of which is assigned a definite unit of territory for survey. Each group is supervised by an experienced squad leader who is directly responsible to the State Leader for the quality of the work accomplished by his squad.

## Methods of Survey and Eradication

The early work in barberry eradication taught well the lesson of thoroughness. Barberries may be expected to be growing in any place where the seeds can germinate and bushes become established. Therefore, all timber, brush, waste lands, fence rows, and stream banks must be carefully searched in the regions where bushes are known to have spread or "gone wild." In timber or brush-covered territory a careful inspection is made to insure that bushes are not being overlooked. The squad leader constantly checks the work done and the method of inspection employed.

Digging and grubbing of bushes was the usual means of eradication in the first part of the campaign. This method has been replaced by the use of common salt, which kills rapidly when applied at the crown of a bush. Salting is a cheaper method of eradication, providing insurance against the subsequent appearance of sprouts, a difficulty frequently encountered when bushes are dug. Digging still must be resorted to where barberry bushes grow close to valuable shrubbery which also may be killed if salt is applied.

## Progress in Previous Years of Barberry Eradication

Barberry eradication was begun in 1918, soon after the great rust ep-

idemics of 1916 had demonstrated that black stem rust was the cause of enormous losses of grain. The first course of action was to make a very hurried survey of the spring-wheat States in an attempt to remove as many bushes as possible in a short time. This survey was conducted as a war-time emergency measure to increase the food-producing capacity of the country. The bushes were believed to be relatively few in number and located principally in cities and about farmsteads. Approximately 3,000,000 common barberry bushes were destroyed in this first survey of the State. (See map of locations at the end of this report.) This survey was of great value in eliminating sources of rust in many regions and in putting an end to the spread of bushes into new localities.

As a result of the first survey it soon became evident that barberry had gained a much greater foothold in Wisconsin than was suspected. Rather than being limited to planted bushes in cities and about dwellings, as supposed, common barberry was found to have escaped from cultivation, growing abundantly in many noncultivated areas.

With the completion of the first survey a second more intensive survey was begun, which is still in progress. By a method of very careful inspection the entire area of a county is surveyed and the bushes found and destroyed, whether in city or rural districts. Thus far 125,126 bushes have been destroyed by this second survey.

In connection with survey and eradication an educational campaign has been conducted in an effort to acquaint people with the common barberry and to teach them that it is a menace in a grain-producing locality. This educational activity has been conducted through the schools, the press, and by special demonstrations and talks. People are becoming well informed as to the reasons for barberry eradication and the results that may be expected from the successful completion of the campaign.

## Barberry-Eradication Activities in 1929

In 1929 field activities were begun on May 1 in an area of escaped or "wild" barberry bushes growing about Lake Geneva and in the adjacent territory of Walworth County. These bushes were considered a special menace in this region as they were very likely to be transported by tourists innocent of the identity of the shrub. A total of 1,299 bushes and seedlings was destroyed in this locality during the season.

By June 19 the barberry-eradication force was composed of 31 field agents, the maximum number employed for the year. The activities for the season were limited to Dane, Rock, and Walworth Counties. The survey was not completed in any of these counties, although in Rock County only three townships remain to be covered by the intensive survey.

In one region comprising 10 sections in Rock County a new area of escaped bushes was discovered that had spread from one original planting. This area was completely inspected by a squad of six men within a period of a few weeks, and all bushes found were destroyed. Future check-ups for new seedlings

must be made, although the greater part of the job of eradication is now finished. The elimination of such new areas before they become widespread, as they are in some localities of Wisconsin, constitutes real economy. Barberries outside of this area of escaped bushes were found to be very evenly distributed over the entire county, as the dot map in this report shows. In Rock County 4,391 bushes and seedlings were destroyed.

In Dane County activities were confined to two very large areas of escaped bushes where thousands of bushes have been growing wild for many years. Eradication here is very difficult and expensive. These regions represent the conditions that would exist in the entire State if bushes were allowed to spread normally. In Dane County approximately 40,749 bushes and seedlings were destroyed during the season.

Most barberry bushes found in Wisconsin in the past year were treated with salt, demanding the use of more than 85 tons.

## Rust Observations in Wisconsin During 1929

### Black Stem Rust

Black stem rust was found on grasses near barberry bushes this year on May 18, almost two weeks earlier than any report from Wisconsin in previous years. As the season progressed many other instances of rust spreads from barberries were noted. Weather conditions during the growing season were quite favorable for the development of the rust which had caused considerable damage by the time the crop was mature. The loss was suffereed chiefly by the oats and spring wheat crops, the other grains maturing before rust became severe. Damaging stem rust was confined for the most part to the southern portion of Wisconsin, the region where barberry bushes have been found most abundant and where many escaped bushes are known to be growing. (See dot map in this report.)

### Crown Rust of Oats

The year also was very favorable for the development of crown rust of oats, which, as well as stem rust, was responsible for a large part of the loss in the oat crop this season. This disease, which is spread from the buckthorn bush, a common hedge plant in Wisconsin, will not be affected by the campaign to eradicate the barberry. It would be well for oat raisers to make certain that their groves and fence lines are not harboring buckthorn as well as common barberry bushes. Crown rust attacks only the oat plants, while stem rust attacks the four small grains -- oats, barley, rye, and wheat.

### Leaf Rusts

Leaf rusts of wheat, rye, and barley were found as usual, but were of no appreciable consequence.

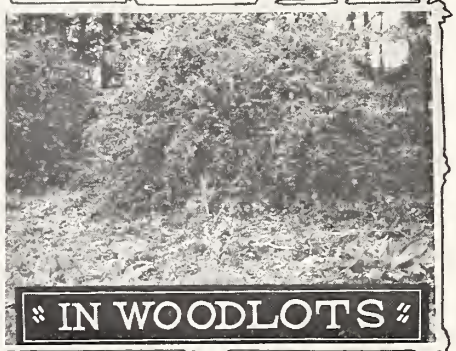
FLOWERS
(*yellow*)

# Where Barberry Bushes Grow

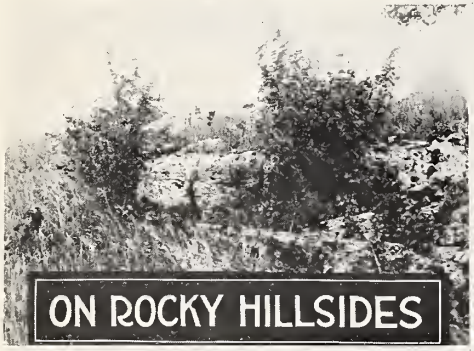
BERRIES
(*bright red*)

" IN DOORYARDS "

BIRDS CARRY BARBERRY SEEDS SEVERAL MILES, DROPPING THEM AMONG ROCKS AND IN OUT-OF-THE-WAY PLACES



" IN WOODLOTS "



ON ROCKY HILLSIDES


AS HEDGE FENCES

*Barberries spread by birds*

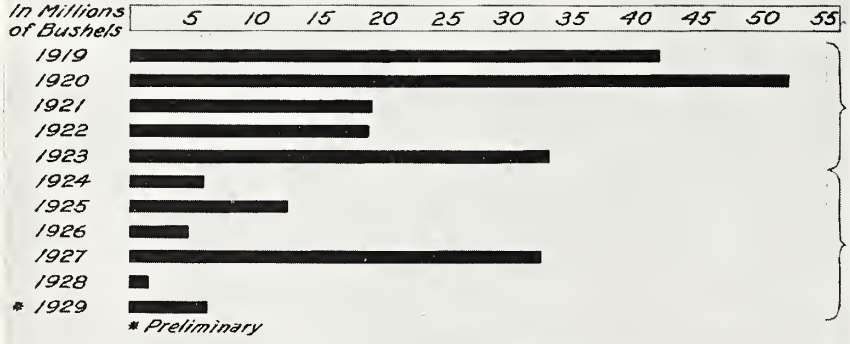
" UNDER OTHER " SHRUBS and TREES

*Salting a bush*

*Sprouts from a dug bush*

# *Common Salt Kills Barberry Bushes and Prevents Sprouting*

## Wheat Losses in Barberry Eradication Area, 1919-1929

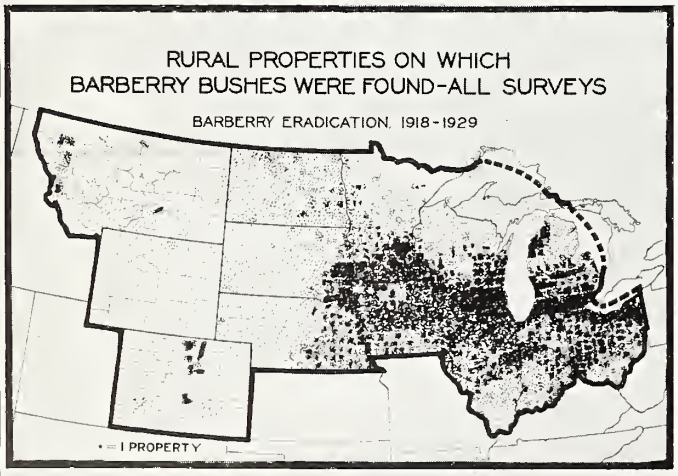


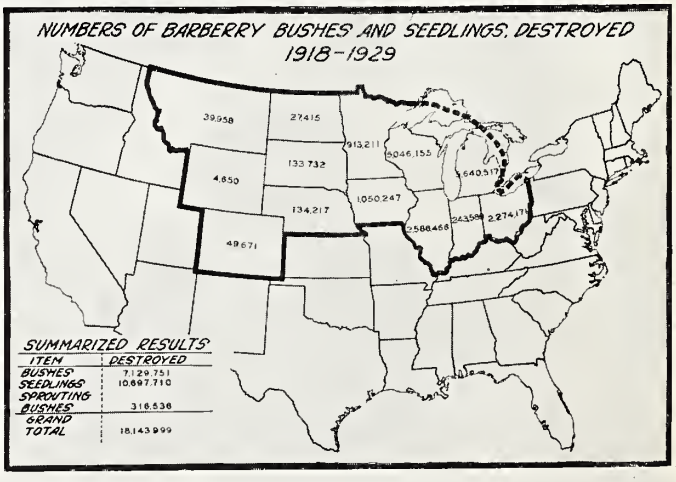

The average annual loss for the first five year period, 1919 to 1923, was approximately 33,000,000 bushels.

The average annual loss for the next six year period, 1924 to 1929, was approximately 10,500,000 bushels.

The losses to small grain crops caused by black stem rust have been reduced since the beginning of the barberry eradication campaign in 1918. The breeding of rust-resistant varieties, the use of early maturing varieties, and the sowing of crops early, have aided barberry eradication in this reduction.

# "BARBERRY ERADICATION PAYS"




Prepared by the Rust Prevention Association, 300 Lewis Building, Minneapolis, Minn., in co-operation with Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.

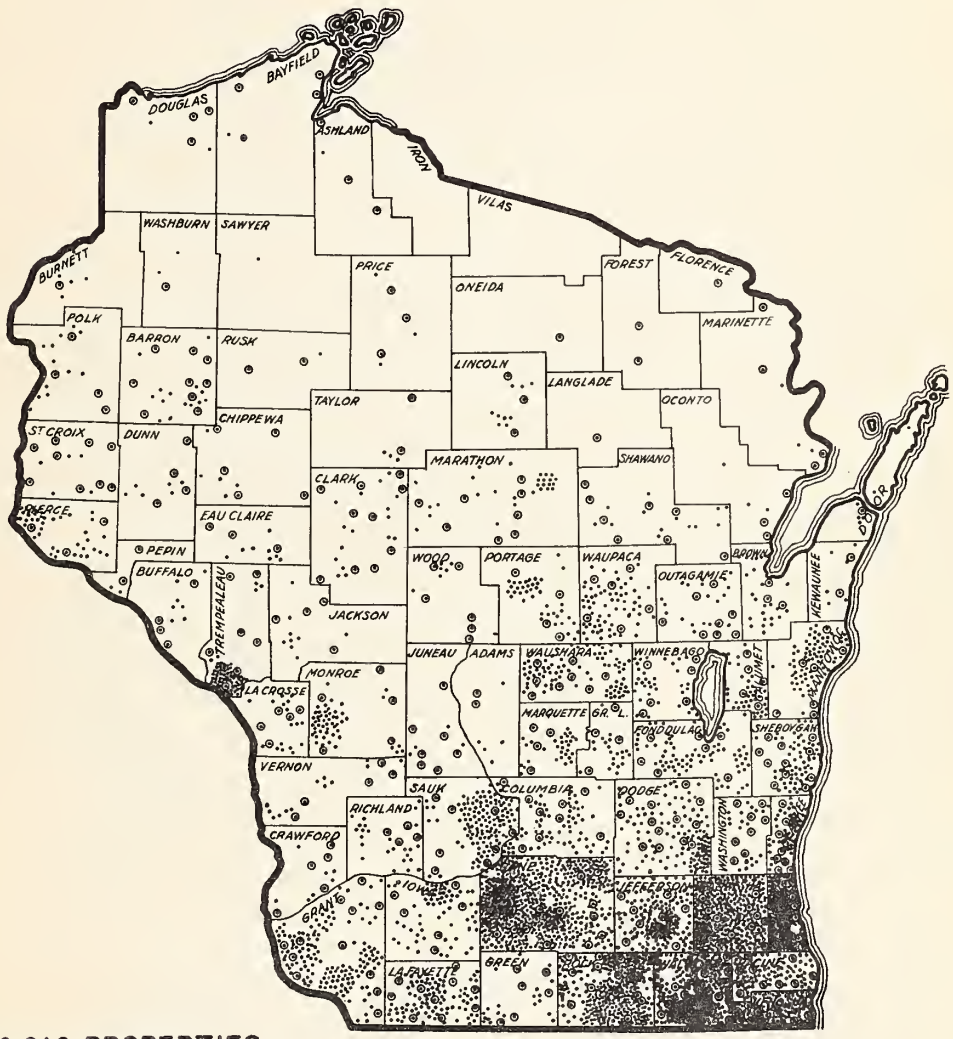
## Future Barberry Eradication

It is known that many common barberry bushes were planted in the thickly populated sections of Wisconsin by the early settlers. Seeds from these bushes have been widely scattered, which necessitates a careful second survey in all counties where large numbers of bushes were found upon the first hurried inspection. The second survey will be conducted first in the more heavily barberry-infested regions of the southern counties, and will progress northward as time and money permit. Many years will be required for this work, and during that period it is well for farmers in all parts of the State to make certain, for their own protection, that rust-spreading barberry bushes are not growing on their properties or near their grain fields.

Washington, D. C.,
March 1, 1930.

# PROPERTIES HAVING BARBERRY BUSHES 1918-1929

## WISCONSIN



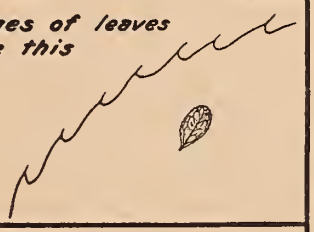

10,810 PROPERTIES
5,049,702 BUSHES

- FARMS HAVING BARBERRY BUSHES
- TOWNS HAVING BARBERRY BUSHES

# Common Barberry Spreads Black Stem Rust

When you find a spiny bush with-

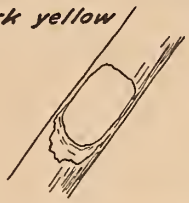
Edges of leaves like this



Spines like these

Berries like these

Inner bark yellow



It is a **Common Barberry** and should be reported at once

## Know Common Barberry

## Look For It!

Spread of Barberries by birds

Birds eat the berries

Carry them to their roosting places

Where they cough up the seeds

From which seedling bushes grow

They in time bear fruit which is again carried farther on

## Look For and Report All Common Barberry Bushes

*To the State Leader of Barberry Eradication, in care of your State Department of Agriculture or your State Agricultural College.*

# Common Barberry Bushes

*spread*

# *Black Stem Rust*

*to*

WHEAT, OATS,
BARLEY, RYE,
*and* Many Wild
Grasses

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